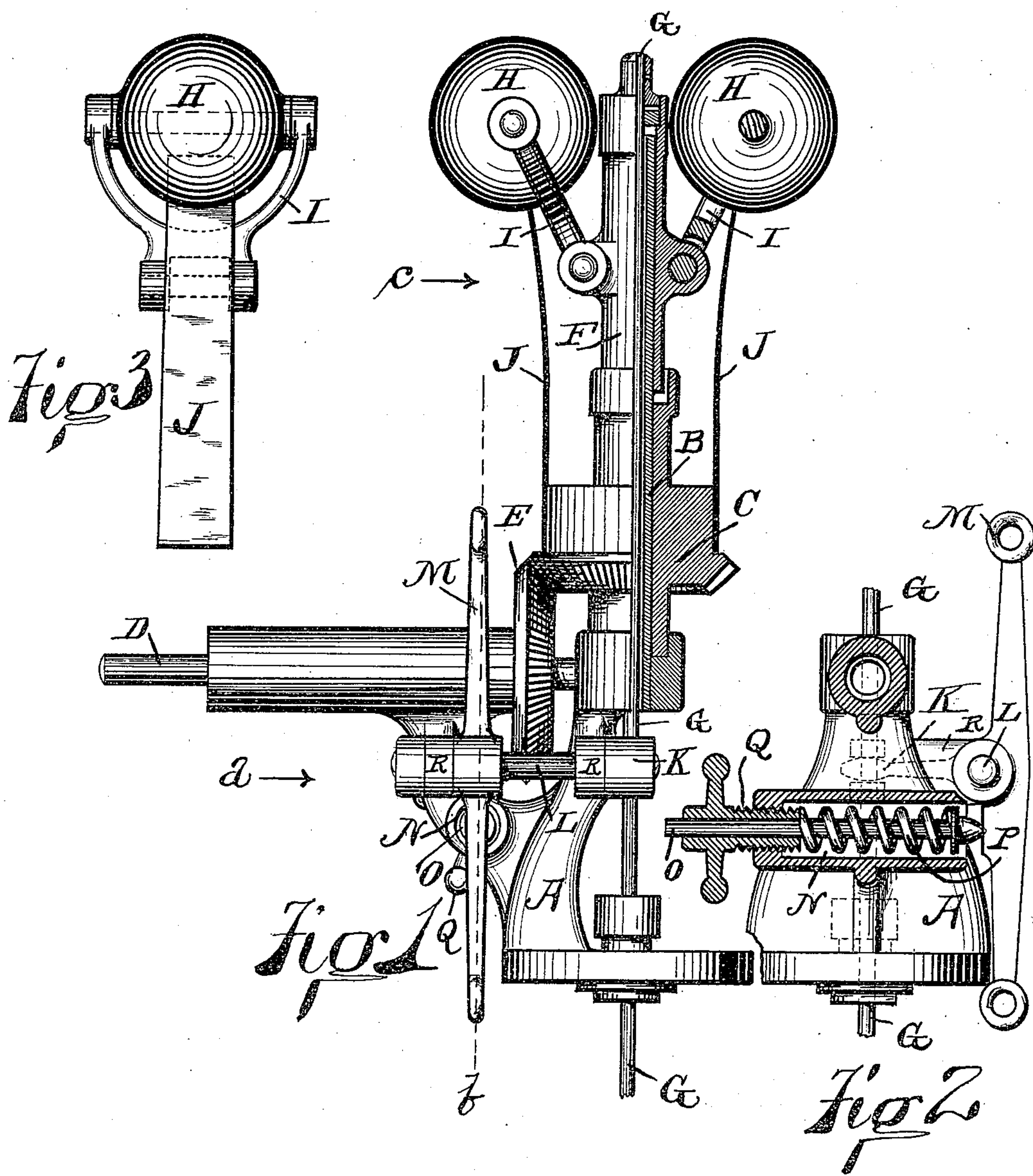


(No Model.)

R. W. & J. W. GARDNER.
GOVERNOR.

No. 300,705.

Patented June 17, 1884.



Witnesses:

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UNITED STATES PATENT OFFICE.

ROBERT W. GARDNER AND JOHN W. GARDNER, OF QUINCY, ILLINOIS, ASSIGNORS TO THE GARDNER GOVERNOR COMPANY, OF SAME PLACE.

GOVERNOR.

SPECIFICATION forming part of Letters Patent No. 300,705, dated June 17, 1884.

Application filed February 27, 1884. (No model.)

To all whom it may concern:

Be it known that we, ROBERT W. GARDNER and JOHN W. GARDNER, of Quincy, Adams county, Illinois, have invented certain new and useful Improvements in Governors, of which the following is a specification.

This invention relates to centrifugal governors for steam-engines, &c.

In United States Letters Patent No. 287,822, granted November 6, 1883, for an improvement in governors, upon the application of Robert W. Gardner, is set forth a governor in which the balls are supported upon the upper free ends of vertically-arranged blade-like springs which serve as the main centripetal elements. In that device the outward movement of the balls was in a path having a curvature determined by the sweep of the springs, the tendency of the ball as it flew outward being downward, which downward tendency was communicated to a sliding sleeve provided with radial arms upon which the balls impinged. The valve-stem or regulating-rod was so attached to the sleeve as to partake of its movements.

The present invention presents many of the peculiar characteristics of the governor set forth in the above-mentioned patent, which may be incidentally referred to in connection with the description of the present device.

The present invention will be fully understood from the following description, taken in connection with the accompanying drawings, in which—

Figure 1 is a front elevation, part section, of a governor embodying our improvements; Fig. 2, a vertical section upon the line *b* of Fig. 1, as viewed in the direction indicated by the arrow *a*; and Fig. 3, a side view of one of the balls and its immediate attachments as viewed in the direction indicated by the arrow *c* on Fig. 1.

In the drawings, A represents the housing of a governor, of the form commonly employed in governors, arranged in direct connection with the steam-valve operated; B, a stiff tube with its lower end rigidly secured in the housing, with its axis corresponding with the axis of the governor; C, a bevel-gear fitted to revolve freely upon the tube; D, the pulley-shaft of the governor; E, the bevel-

gear on the pulley-shaft, by which motion is given to the gear C, and through it to the centrifugal parts of the governor; F, a sleeve fitted to revolve freely and reciprocate freely upon the exterior of the tube; G, the governor-stem, so attached to the sleeve F as to reciprocate with it, this stem being carried downward through the tube to make connection with the governor-valve or other means of regulation; H, the governor-balls disposed near the top of the sleeve; I, bifurcated links pivoted to the sleeve so as to oscillate outward and downward, and supporting at their upper ends journals upon which the balls are freely but not loosely fitted; J, a pair of blade-springs—one for each ball—rigidly secured at their lower ends to the hub of the gear C, and at their upper ends rigidly secured to the balls; K, the usual toe-lever engaging the governor-stem; L, the shaft of the toe-lever; M, a double-ended lever fixed upon the shaft L; N, a cylindrical cavity in the housing, oppositely disposed to the lever M at a point below its axis of oscillation; O, a push-pin axially arranged in this cavity and impinging with its end against the lever M; P, a spiral spring surrounding the push-pin, engaging a shoulder upon the pin and inclosed in the cavity N, so disposed as to urge the push-pin outward, and consequently, through the instrumentality of the levers, urge the governor-stem downward; Q, a hand-screw threaded into the rear of the cavity N, surrounding the heel of the push-pin, and serves as an adjustable abutment for the spiral spring; and R, the bearing in which the lever-shaft is supported.

The springs J are so strained that their tendency is to press the balls inward, whereby they serve as the main centripetal agents. As the balls fly outward under centrifugal influence they will move in a curved horizontal path, which may be generally described as an arc modified by a radius of changing length, the radius being represented by the flexing springs J, rigid at the lower ends.

The links I represent a radius of lesser length than that corresponding with the arc described by the balls in their outward movement. The sleeve to which the lower ends of the links are pivoted, being free to rise and fall, nullifies the effect of the links in determining the

arc in which the balls travel. As the balls fly outward in their peculiar path the sleeve is drawn upward by the links, and as the balls move inward the sleeve is pushed downward.

5 The system may be typified as a moving body arranged at the common axis of two diverging radii of different length, the extremity of the longer radius being fixed, and the extremity of the shorter radius being free to adjust itself with reference to the extremity of the longer radius.

The springs J are narrowest at the balls, as indicated in Fig. 3. The effect of this practical weakening of the spring toward its free end is to concentrate most of the curvature at its extreme of flexure at the upper portion of the spring, whereby under extreme flexure the "radius," if such it may be called, of the ball-arc becomes greatly shortened as the balls move outward; hence as the ball moves outward there is less conflict between the radius of the ball-arc and the radius of the links. By this means we secure a direct graduating governing action.

25 While we set forth the springs J as fitted to serve as centripetal agents, and at the same time as practical links for controlling the arc of ball travel, we do not confine ourselves to the structure in which the springs fulfill both offices. Long links may take the place of the springs, and springs as centripetal agents simply may be so connected as to urge the balls inward.

35 It will be noticed that as the balls move outward under increase of speed the sleeve and governing-stem move upward; hence the regulating-valve, or whatever device the stem is to actuate, must be arranged with this effect in view. If the stem is attached directly to a valve, the closing motion of the valve is to be an upward one.

The lever M, with its shaft and toe-lever, is the usual arrangement of speeder and sawyer's cut-off. The tendency of the spiral spring is to urge the governor-stem in a direction suited to increase the speed of the motor. The tension of the spring is adjusted by means of a hand-screw, Q, the recess N serving to inclose the spring, and the position of the recess or casement of the spring is such as to be neatly and cheaply embodied in the housing and be free from liability to be clogged by dirt or be disturbed by accidental contact.

We claim as our invention—

1. In a governor, the combination of the governor-balls, the springs for urging the balls inward and determining their arc of travel, the links I, attached to the balls and having a length less than the radius corresponding to the arc of ball travel, and having their lower pivots free to rise and fall, and a reciprocating body connected to said pivots and adapted to transmit their rising and falling motion to a regulator, substantially as set forth.

2. In a governor, the combination of the governor-balls, the pivoted links, and the arc-controlling springs J, having a decrease of area at their upper ends, substantially as and for the purpose specified.

3. In a governor, the combination of the housing A, the governor-stem G, the levers K and M, the spiral spring P, and hand-screw Q, combined substantially as and for the purpose specified.

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